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Comparing the effect of delayed serum separation on creatinine measurement by Jaffe method with Sarcosine oxidase enzymatic method

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Introduction Creatinine is a nitrogenous organic waste product and increased in serum under abnormal renal function. Commonly used methods for creatinine measurement are Jaffe and enzymatic methods. Delays in serum separation may cause changes in serum creatinine level. This could lead to misclassification of the stages of Chronic Kidney Disease.

Objectives To compare the effect of delayed serum separation from blood on creatinine measurement by Jaffe method with enzymatic method.

Methodology Ethical clearance was obtained from Ethics Review Committee, Faculty of Medicine, University of Jaffna. Study was carried out in normal pooled serum. Ten millilitre (10 mL) of blood from 3 healthy persons were collected. Blood samples were equally divided in to 5 tubes of two sets and were stored. Creatinine concentrations in the serum stored for 2 and 6 hours and 1, 2 and 3 days, at room temperature (≃27-29°C) and in a refrigerator were measured.

Results Creatinine concentrations in the serum separated from the blood samples stored at room temperature for 2 and 6 hours, 1, 2 and 3 days were 1.23 (±0.01) and 1.47 (±0.01) mg/ dL 1.74 (±0.02), 2.12 (±0.07) and 2.24 (±0.07) mg/dL respectively by Jaffe method, and 1.11 (±0.01) and 1.22 (±0.01) mg/dL , 1.31 (±0.04), 1.41 (±0.03) and 1.47 (±0.01) mg/dL respectively by enzymatic method. The p-value less than 0.05 ($p < 0.05$) was considered statistically significant. Significant changes were observed after 6 hours of blood storage. The mean creatinine concentrations measured in blood samples stored in the refrigerator for 2 and 6 hours, 1, 2 and 3 days were 1.25 (±0.01) and 1.32 (±0.02) mg/dL , 1.49 (±0.01), 1.67 (±0.09) and 1.72 (±0.07) mg/dL resoectively by Jaffe method, and 1.09 (±0.01) and 1.10 (±0.01) mg/ dL, 1.19 (±0.01), 1.23 (±0.09) and 1.32 (±0.07) mg/dL respectively by enzymatic method. Statistically significant changes were observed after 24 hours of blood storage by Jaffe method and after 48 hours by Enzymatic method.

Conclusions According to p-value obtained from each storage condition blood samples can be stored up to 6 hours at room temperature without significant changes in serum creatinine level. Storage in a refrigerator is the best method for delayed serum separation. Enzymatic method gives more accurate values of serum creatinine level than the Jaffe method.